



The annual number of global congress, symposiums and scientific meetings is unknown, although it is more than 100,000 worldwide. A recent article published in JAMA questions the usefulness of all this deployment. While it is true that there are many conferences, not all are the same, some meetings are “special”.

Some of them are important because of the relevance of the society that organizes them, for example the last AAGL Global Congress in which gynecologists from all over the world meet to talk about minimally invasive surgery in the city of Las Vegas.

Other meetings are organized by societies with a large number of members, as happened with the AICOG (All Indian Congress of Obstetrics and Gynecology) that was held this past January in Bengaluru. A mega congress that deals with oncology, maternal-fetal medicine, infertility, reproductive health, surgery and almost anything that has to do with gynecology.

Other congresses are important for the interest and dedication of emerging societies, societies that bring together great professionals who have a common goal: to learn and improve.

Our congress has a bit of this last. If I had to answer the question what makes this congress special? I would need only two words: Passion and Friendship. The first and most important is thing is passion. There is something that we must never forget in life. We must never forget that we are doctors, that our main goal is to help. Help our patients to solve a problem, help them to conceive a pregnancy, help to improve the quality of life of those who need our help..... and also help our colleagues. We must put our passion in our work, in our training. Being a doctor is something that must be lived with passion. As Stefano said, "passion makes a difference".

The second thing is friendship. The international group of hysteroscopists is like a big family, in which friendship is always present. A group of friends who enjoy what they do, who LOVE hysteroscopy and who have fun doing their job.

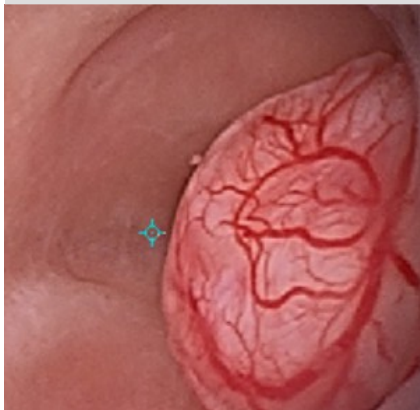
The passion for what we do and the friendship that exists between us results in the magic of the Global Congress ... it can be seen all around.... you can feel it... you can even catch it, and if you take the magic and carry it with you, you will become a great hysteroscopist and one of this little family. You will be one of us!!!!

Welcome to the 2019 World Hysteroscopy Congress

Luis Alonso  
Co-chair Global Congress on Hysteroscopy



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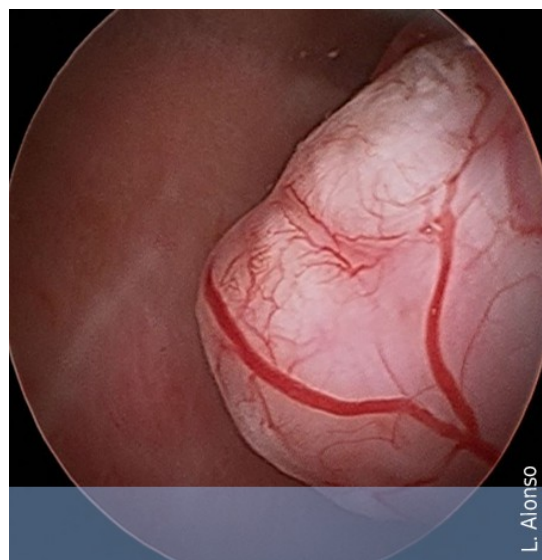
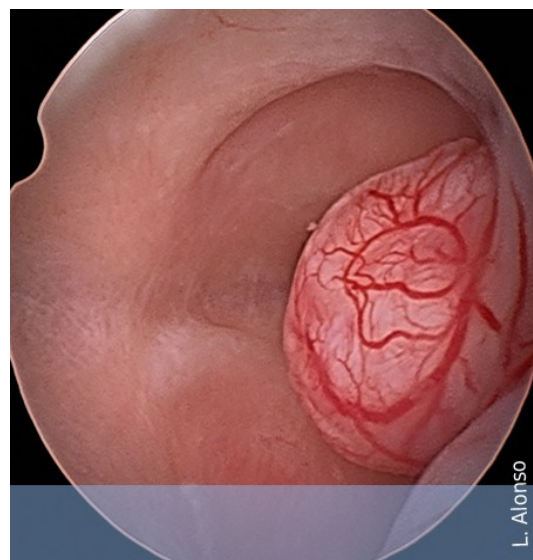
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HYSTEROSCOPY  
PICTURES*Submucous myoma**Detailed view of the  
superficial vessels*

*Uterine leiomyomas are frequent, have an impact on reproductive function and on women quality of life. They are classified according to their location in the uterus, and submucosal fibroids would be most related to the uterine bleeding. When they are symptomatic, should be removed by surgery and the approach for myomectomy depends on their classification.*

*In 1978, Neuwirth held the first hysteroscopic myomectomy using urological resectoscope with applying surgical technique similar to the resection of the prostate, with a resectoscope and "U" loop, slicing the fibroid and, sometimes, damaging the adjacent myometrium. The slicing technique fibroid, gold standard technique, leads to severe exposure lump vessels, causing greater blood loss, through strain absorption and sometimes myometrium damage with consequences for reproduction. Some authors already make hysteroscopic myomectomy using the pseudocapsule. Litta et al, make the release after the resection of the intracavitary portion of the myoma, while Mazzon releases the intramural portion of the fibroid with cold loop. The uterine myoma pseudocapsule is a fibrous structure surrounding the neurovascular leiomyoma, separating it from the normal peripheral myometrium.*

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*The responsibility of the signed contributions is primarily of the authors and does not necessarily reflect the views of the editorial or scientific committees.*

*If you are interested in sharing your cases or have a hysteroscopy image that you consider unique and want to share, send it to [hysteronews@gmail.com](mailto:hysteronews@gmail.com)*

# INTERVIEW WITH...

Some individuals are able to see future events in the surgical world. Doc. Mario Franchini is one of those “visionaries” of the hysteroscopy.

**You have more than 25 years of experience performing hysteroscopy. What are the major changes observed over time?**

I started hysteroscopic procedures in the late 1970s, early 80s. Therefore, I started to perform hysteroscopy over 40 years ago using the scope like a Hegar dilator. I consider myself lucky to have lived through all the hysteroscopic history until now.

At the start of my career there was a big wall between diagnostic and operative steps due to a limitation in technology. Only at the end of 90s I started, with many friends, to drill holes in the wall with vaginoscopic approach using small diameter scope and miniaturized innovative instrumentations.

Finally, in the mid-2000s, we broke the wall down and the see & treat approach was completed using mini-resectoscope and mechanical tissue removal system.

The last advances in hysteroscopic surgery were two devices for hysteroscopic tubal sterilization (Essure and Adiana) and mechanical tissue removal system. Tissue removal system is the first automation technology used in hysteroscopy. The full role that automation will play in performing complex hysteroscopic surgery in the future is unclear.

I hope to experience this with my close friend, Giampietro Gubbini because we agree with Shimon Peres “You are as young as your dreams, not as old as your calendar”.

"Un buen entrenamiento y un número suficiente de casos son fundamentales para convertirse en un histeroscopista experto"

**There is a growing interest in hysteroscopy, what can we do to promote the hysteroscopy?**

Two simple answers,

-Firstly, high-quality training courses during university education. Many residents have completed their studies without performing any hysteroscopic procedures and have poor knowledge of instrumentations and technologies. I have met a lot of them, during my educational activities, who are trying to learn what they should have learnt years before during university studies undertaken.



**Mario Franchini**

Dirigente medico  
presso azienda  
sanitaria di firenze

Florence, Italy



Scuola Italiana  
di Chirurgia Mini Invasiva  
Ginecologica



-Secondly reduce the cost of technologies / items and improve reimbursement.

Healthcare expenditures have increased and economic assessment has been an integral part of decision making. Since the costs of several items, especially disposable, have still been highly expensive and the reimbursement from providers very low, implementation of hysteroscopy is still far from becoming a reality.

I think, we have to press healthcare providers to increase reimbursement, instead of waiting the reduction of item costs that only market competition can get,

### **In your opinion, has hysteroscopy reached its limits?**

We have had so many innovations in technology and device in the last 20 years. I think, to date, it is difficult to reduce further diameter scope and remove pathology with the present technology. The last advance in hysteroscopic surgery, mechanical tissue removal system, with small blade and small diameter scope, can remove large size pathology because it is an extremely powerful tool. I believe, we need to have this technology in our arsenal to improve healthcare.

### **How important are courses and training "hands on" in hysteroscopy?**

Many residents have completed their studies without performing any hysteroscopic procedures and having a poor knowledge on instrumentations and technologies.

Therefore, getting familiar with the instruments and complex devices, moving hysteroscope in pelvic trainer and performing surgery in models are the goals of courses.

Furthermore, formal trainings allow access to the latest technologies, discussion of the newest strategies for innovative clinical settings, and to ensure high standards of accreditation.

### **Do you have any advice for the young physician that is starting out in the world of gynecologic minimally invasive surgery?**

My advice is to see what the experts do and perform as many cases as he/she can do during the protected learning curve. Moreover, he/she needs to be prepared to move from one university to another to complete the learning process.

The young doctor should continuously stay on top of what is current in endoscopy with the passion to discover. Learned activities and those seen performed by experts should be repeated with new instrumentations and techniques during all their professional life. (never stop learning and improving!)



# HYSTERO P rojects

## Hysteroscopy Newsletter & OBG Project

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# Case Report

Hysteroscopy Newsletter Vol 5 Issue 3

## Levonorgestrel Intrauterine System in early pregnancy: a case report

Dr. Thiago Guazelli

Professor/ Coordenador do Centro Avançado de Treinamento em Histeroscopia – Cathis- Brasil

### ABSTRACT

The IUS is a highly effective long acting reversible contraceptive (LARC). It's failure rate is 0.1% (Pearl Index). Because of its high efficacy, it is uncommon to find a pregnant patient with IUS

Palabras clave:

Levonorgestrel Intrauterine system, pregnancy, IUD

A 37-year-old woman presented to the hysteroscopy department referring to early pregnancy and the presence of levonorgestrel intrauterine system (IUS). The hysteroscopy was performed at 8 weeks and 3 days pregnancy, in a surgical environment, without anesthesia, the material used was Bettocchi system with a 2.9 mm scope, grasping forceps and saline solution as distension media. The procedure occurred without complications, in less than 2 minutes, safely and with good results. The patient was discharged soon after.

### CASE REPORT

A 37-year-old woman presented to the hysteroscopy department referring to early pregnancy and the presence of levonorgestrel intrauterine system (IUS).

She had no complains, ultrasonography (USG) findings indicated 7 weeks gestation and showed that the IUS was inside the uterine cavity and no threads were found by speculum examination. The patient and her partner were advised about risks and benefits in two consultations with an interval of 1 week, so they could deliberate over it.

The hysteroscopy was performed at 8 weeks and 3 days pregnancy, in a surgical environment, without anesthesia, the material used was Bettocchi system with a 2.9 mm scope, grasping forceps and saline solution as distension media. The procedure

occurred without complications, in less than 2 minutes, safely and with good results. The patient was discharged soon after.

39 weeks postoperatively, the pregnancy continued with an adequate evolution, no intercurrent or abnormalities.

### DISCUSSION

The IUS is a highly effective long acting reversible contraceptive (LARC). It's failure rate is 0.1% (Pearl Index). Because of its high efficacy, it is uncommon to find a pregnant patient with IUS. We do not have specific protocols for this situation, so we used the protocol for Intrauterine Device (IUD) and gestation.





About 15% to 27% of pregnancies when IUD fail are ectopic (Rowe, 2016; Heinemann, 2015). In the case of intrauterine pregnancy, it is important to remove the IUD as soon as possible in case the threads is visible. A systematic review of observational studies (Brahmi 2012) concluded that, compared to women who became pregnant without an IUD in situ, there is increased risk for pregnancy complications such as miscarriage, preterm delivery, septic abortion, and chorioamnionitis. From the limited evidence available, it appears that early IUD removal in pregnancy may help improve outcomes, although it does not necessarily eliminate the risks. (Ozgu-Erdinc, 2014)

If a woman becomes pregnant with concomitant use of the IUD, she should be advised to appropriate removal of the intrauterine method, if possible, before 12 weeks of gestation. The IUS guideline advises that in case of failure, ectopic pregnancy should be excluded and the IUS should be removed.

The evidence of pregnancy outcomes with IUS in situ is limited, but there is no evidence of congenital defects.

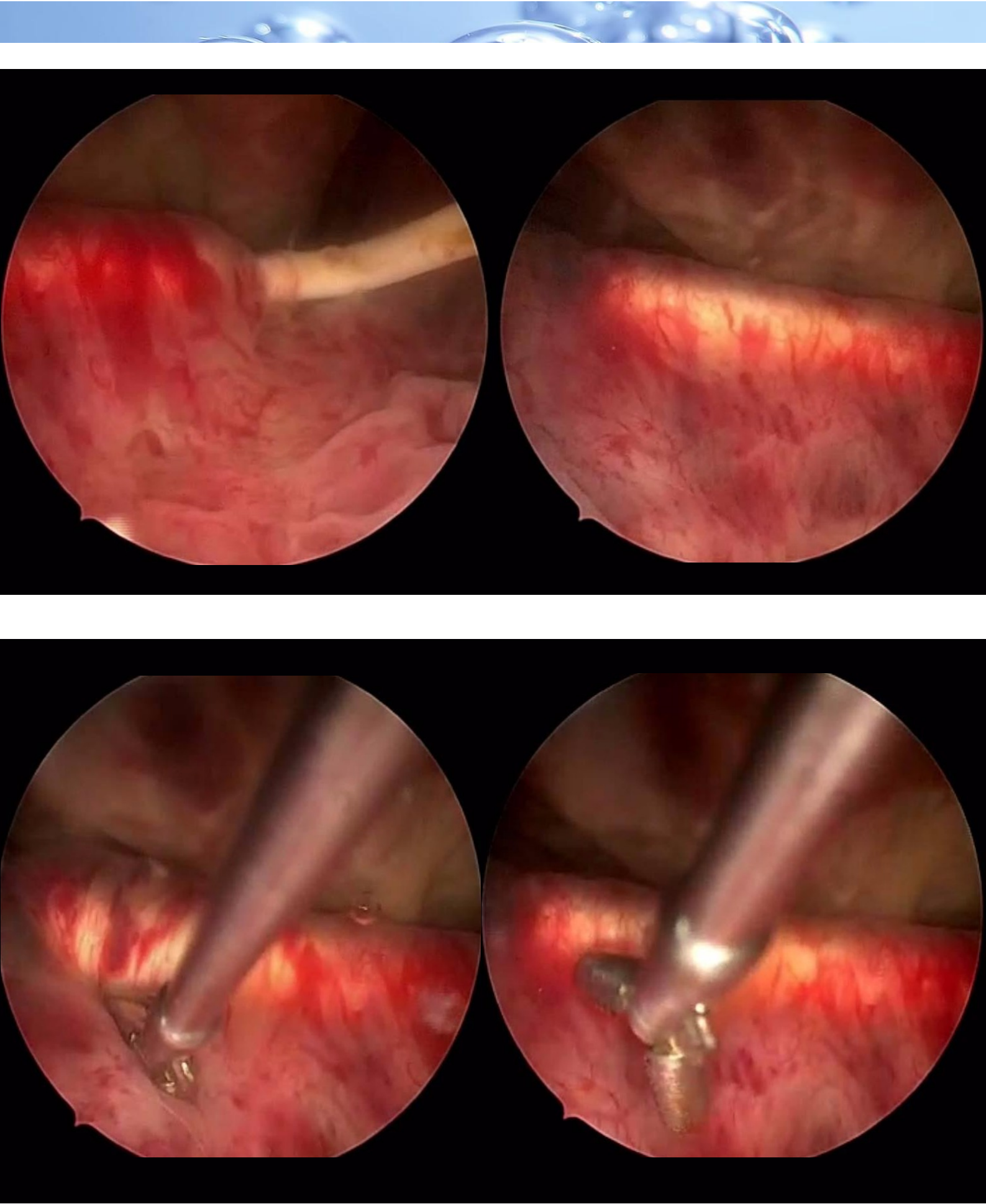
After confirming the gestational diagnosis, it is important to guide the couple / patient about the benefits and risks of IUD withdrawal. You should complete this step in detail in the medical record and, if necessary, ask to sign a consent form. Removal can be done by simply pulling the IUD thread through the specular examination.

When the IUD thread is not visible, a transvaginal ultrasonography should be performed to confirm its intrauterine location, considering possible expulsion or perforation. If it is not possible to confirm its location during pregnancy, it is important to exclude uterine perforation through an abdominal radiograph (Intrauterine Contraception, April 2015).

The indication of hysteroscopy for IUD withdrawal during pregnancy will be made in cases where the thread is not visible and its intrauterine presence was confirmed by ultrasonography. It can be done with Bettocchi's ambulatory hysteroscope, avoiding cervical dilatation. There are no studies on the pressure of the distension or on the luminosity, so saline solution should be used with the minimum pressure required to perform the procedure, usually close to 50-70mmHg. Once the IUD is identified, it can be removed with the grasping forceps.

Because it is an unusual situation, there is still no study that proves the significant safety of hysteroscopy, but several authors have demonstrated the success of the technique, such as Lin, 1993; Cohen, 2017; Aguiar Couto, 2008 and Sanders, 2016 with gestation rates that remained 85, 87.5, 75 and 88.4% respectively. No study showed complications during the procedure. IUD and IUS removal in pregnant women is a technique that should be an option in cases where the thread is not visible. We need to publish more cases so we can ensure this conclusion with statistical evidence. Despite the few reports, it has been demonstrated that hysteroscopy is an effective, safe and resolute technique, with rare complications and beneficial, but still off-label.

Autor	Técnica	Número de casos	Abortamento	Complicações no momento do exame
Lin JC et al, 1993	Office Hysteroscopic	28	4	0
Cohen, Shlomo B 2017	Hysteroscopic IUD extraction guided by transabdominal ultrasound	8	1	0
Aguiar Couto, M. Rut 2008	Hysteroscopic	4	1	0
Sanders, Ari P 2016	Hysteroscopic IUD extraction guided by transabdominal ultrasound	26	3	0





# Original Article

Hysteroscopy Newsletter Vol 5 Issue 3

## Endometrial Vascular Dystrophy

Fernando Bullón Sopelana. Professor, Clinical Hospital of San Carlos UCM Madrid. Spain  
Alejandro Pascual Martin. Optional HCSC Area Specialist. Clinical Hospital of San Carlos UCM Madrid. Spain

### SUMMARY

**Objective:** To analyze the cases of "Endometrial Vascular Dystrophy" seen in the hysteroscopy unit of the Clinical Hospital of San Carlos (UCM)

**Methods:** a total of 7,658 hysteroscopies performed in the unit between January 2011 and May 2017 were reviewed. A total of 8 cases were found and hysteroscopies were analyzed as well as the pathology slides.

**Conclusion:** the authors conclude that the so-called "Endometrial Vascular Dystrophy" is not consistent with a vascular alterations, but rather are tortuous (normal) secretory glands filled with retained blood.

The authors can't find an explanation for this phenomenon

Key words:  
  
hysteroscopy,  
endometrial vascular  
dystrophy

### INTRODUCTION

Hamou describes Endometrial Vascular Dystrophy in his Atlas (1), as well as other authors in the literature (2, 3) It is described as a vascular alteration in which the vessels are very tortuous and dilated, assuring that in some cases are thrombosed (2).

They usually describe it in the secretory phase of the cycle or in women under treatment with progestogens (3). Paoletti even puts it in relation to the disease of Rendu- Osler-Weber, genetic disorder of angiogenesis (3). Paoletti describes the follow-up of one of his cases in the next cycle in the proliferative phase and finds complete regression of the lesions (3).

Labastida describes in his book changes in the appearance of the lesion according to the evolution, that is to say that there are more obvious cases than others and that they extend throughout

Pedreschi lo pone en relación con un caso de esterilidad (4).

### METHOD

Hysteroscopies performed in the endoscopy unit of the Hospital Clínico San Carlos between the period of January 2011 and May 2017 are reviewed. Having used an informed consent, which is given to sign the patients before performing the procedure.

A total of 8 cases were identified appropriately documented with videos of the scan. The hysteroscopies are ambulatory, without local anesthesia and practiced with a Wolff continuous flow hysteroscope. The video camera is a Storz HD brand.

The samples for histological study were made with a clamp aimed at the most striking areas and microlensed with Recamier cannula.

Histological study with Hematoxylin eosin stain, as well as immunohistochemical study, with staining of PAS, Alcian blue and glycophorin A

## RESULTS

We have found a total of 8 cases diagnoses as Endometrial Vascular Dystrophy.

All the patients were in women of reproductive age with normal cycles. Four of the cases were associated with the presence of an endometrial polyp, which in no case presented the alterations of the vessels of the rest of the endometrium.

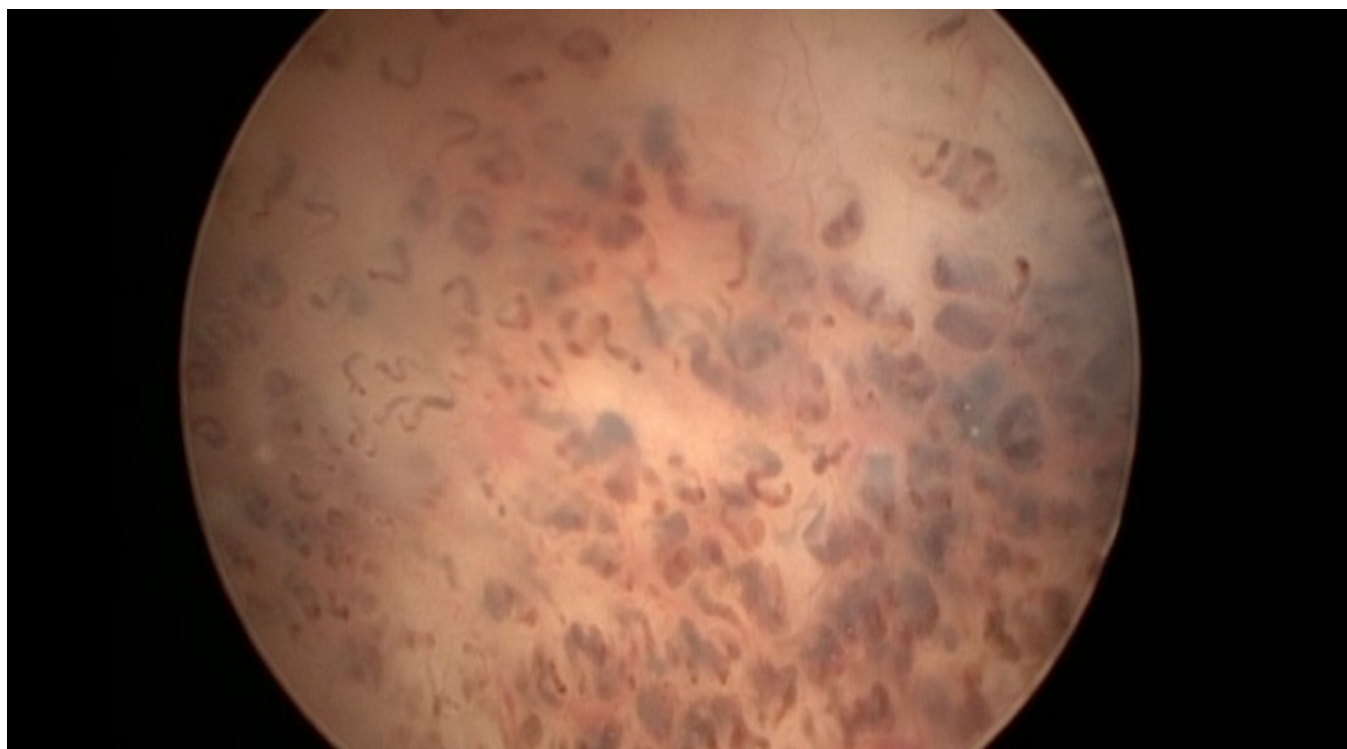
In the hysteroscopy of all our cases, we found tubular, dilated, tortuous formations filled with a brownish content. The blood vessels were of normal thickness. The intensity of the lesion was different in the different cases, as well as the extension, as described in his book Labastida (2). In some, the lesion existed only in the uterine fundus and cornual zones, dilated tortuous formations with a brown content and in some fine superficial vessels of normal characteristics could be distinguished. In other cases, the lesion was diffuse throughout the cavity (Figure 1). In some cases there were small pockets of hemorrhage and

in others none. All the cases, like those described in the literature, were performed during the secretory phase of the menstrual cycle. None were on hormonal treatment.

A characteristic of all the cases, although with different intensity, was the debris of small remains throughout the cavity, which made a cloudy hysteroscopy and secretions of the same brown color as those contained in the supposed dilated vessels. In one case according to the hysteroscopic examination, the ejection of a brown fluid of the same color as those retained in the vessels was visualized. This can be seen in the mounted video of all cases.

The surprise was when analyzing the biopsy specimen realizing that they are not vascular alterations, but secretory glands (hence their tortuosity) filled with retained blood giving its brown color.

The problem is that, if the glands are as shown in figure 2, how does the blood get inside the gland? There are no vessel ruptures, nor stromal hemorrhages. The uterine cavity is filled with secretions similar to those present in the glands, color dark brown, as if they were expelling into the cavity.



We performed different stains in addition to the hematoxylin eosin, to show that there were red blood cells inside the lumen of the glands. Using PAS stain we found, as expected, the glands in the secretory phase filled with positive PAS material and the normal basal membranes, since it stained mucopolysaccharides.

Using Alcian Blue technique, which stains neutral mucopolysaccharides, acids and red blood cells, revealed intraglandular red blood cells.

Selectively, we determined glycophorin A (5) by immunohistochemical technique. Glycophorin A is a sialoglycoprotein present in the membrane of human red blood cells and their precursors, being the most common of the different types of glycophorin. We found, that it is not present within all the endometrial glands, and is also present in the endometrial vessels between normal glands. (fig 3)

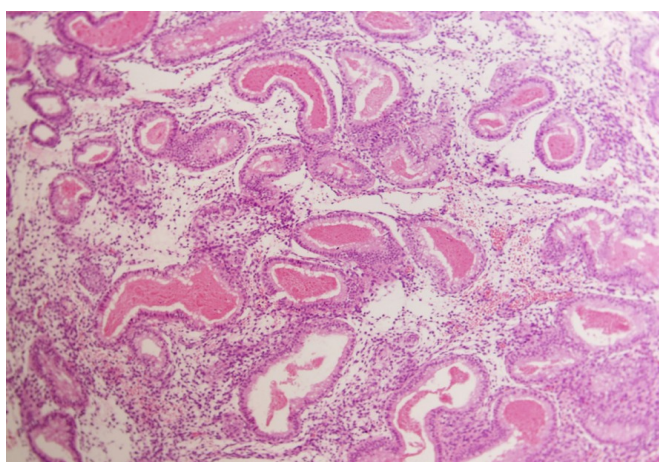


Fig 2 100x HE panoramic view of the endometrium during secretory phase. The glands that stain the most with eosinophil dye are those that contain red blood cells.

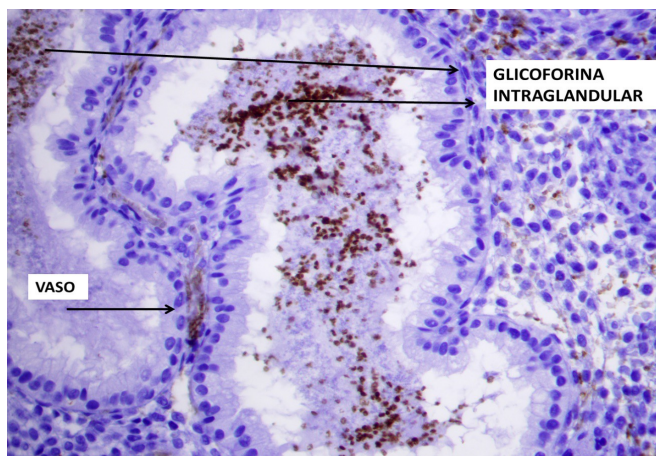


Fig 3 Glycophorin A 400x positive in the lumen of the gland and inside the vessels (normal).

## DISCUSSION

In the literature, we did not find any histological description of the so called “vascular dystrophy”. We only see photos of hysteroscopies in which all the authors coincide in their description, being an image very easy to identify.

What we do not share, is that it is blood vessels or even thrombosis inside of them. We believe that it is evident, with the photos that we present, that it is not blood vessels, but glands in the secretory phase (this is described by all the authors).

They are filled with mucopolysaccharide PAS positive and with the specific staining of red blood cells (glycophoria A) it is shown present inside the glands. What we are not able to understand, is how these red cells get inside the glands?

Blood vessels are normal, there is no hemorrhagic areas seen in the stroma, neither in hysteroscopy nor in histology. The glands are also normal, with a normal basement membrane.

## CONCLUSIONS

The so-called “endometrial vascular dystrophy”, it seems to us, does not exist. The image described are in fact secretory glands, filled with a secretion and blood.

We fail to understand how blood reaches inside the glands, but it is confirmed that there are red blood cells inside the glands (Fig. 3) This phenomenon can be normal part of the menstrual cycle. Paoletti describes the spontaneous disappearance of this phenomenon in the following cycle.

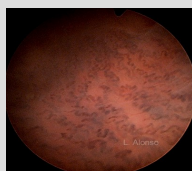
There are women who refer a few days before starting bleeding with a thick brown discharge, very similar to the one seen in the hysteroscopy. We recommend to continue to study this phenomenon in patients describing the presence of premenstrual dark brown discharge.

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# WHAT'S YOUR DIAGNOSIS?



*Answer to last edition:*

***Endometrial Vascular Dystrophy***

Dotto • Bigozzi

## Histeroscopia diagnóstica y terapéutica

*Indicaciones y estrategias*

La histeroscopia moderna es un recurso valioso para todos los ginecólogos y el método de referencia para visualizar la cavidad uterina y tratar numerosos trastornos sin necesidad de efectuar una histerectomía. Este procedimiento nació su desarrollo en la década de 1970 y progresa hasta su complejidad actual gracias a los grandes avances de la tecnología endoscópica y al rápido desarrollo de procedimientos como: técnicas nuevas y sus variaciones intraoperatorias, entre ellas, Jorge Dotto, su primer discípulo latinoamericano, quien publica más tarde con su equipo una completa y precisa clasificación de las imágenes microhisteroscópicas y su correlación con los diagnósticos histológicos.

Histeroscopia diagnóstica y terapéutica. Indicaciones y estrategias cubren los aspectos técnicos con un enfoque práctico y eficaz así en contenido ordenado y didáctico de lo que se debe saber de esta técnica según la visión y la experiencia de destacados especialistas de todo el mundo. Sus principales características son:

- Estudio en profundidad de temas que abarcan el equipamiento instrumental, el estudio de la anatomía patológica, la genética y la clasificación de las imágenes, el diagnóstico y tratamiento del sangrado uterino anormal, de la patología estructural benigna, de la infertilidad y de la patología maligna: la prevención y el manejo de las complicaciones y también el futuro de la histeroscopia.
- Participación de 49 expertos destacados: histeroscopistas nacionales e internacionales, todos en este campo y referentes de la Argentina, España, India, Egipto, Italia, Israel, Estados Unidos, México, Nigeria, Brasil, Francia y Australia.
- La inclusión de imágenes de alta calidad, de utilidad para fijar el diagnóstico visual y su correlación con el estudio anatómico-patológico, conclusiones al final de cada capítulo y referencias bibliográficas para profundizar el estudio.
- Un sitio web complementario con videos de histeroscopias que muestran procedimientos como: resección endometrial y de pólipos, miomectomía con sea fix, morcelación de pólipos y miomas y tratamiento del istmocele.

Una obra de alta calidad científica y de gran utilidad, y de sencilla y clara lectura, dirigida a ginecólogos generales, residentes de ginecología y, en especial, a los especialistas en histeroscopia diagnóstica y terapéutica con experiencia o en formación, para quienes constituirá una herramienta indispensable en su práctica cotidiana.

ISBN: 978-950-05-056-5

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SITIO WEB COMPLEMENTARIO

## Histeroscopia diagnóstica y terapéutica

*Indicaciones y estrategias*

Histeroscopia diagnóstica y terapéutica

Indicaciones y estrategias

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# DEVICES

# GYNESIM



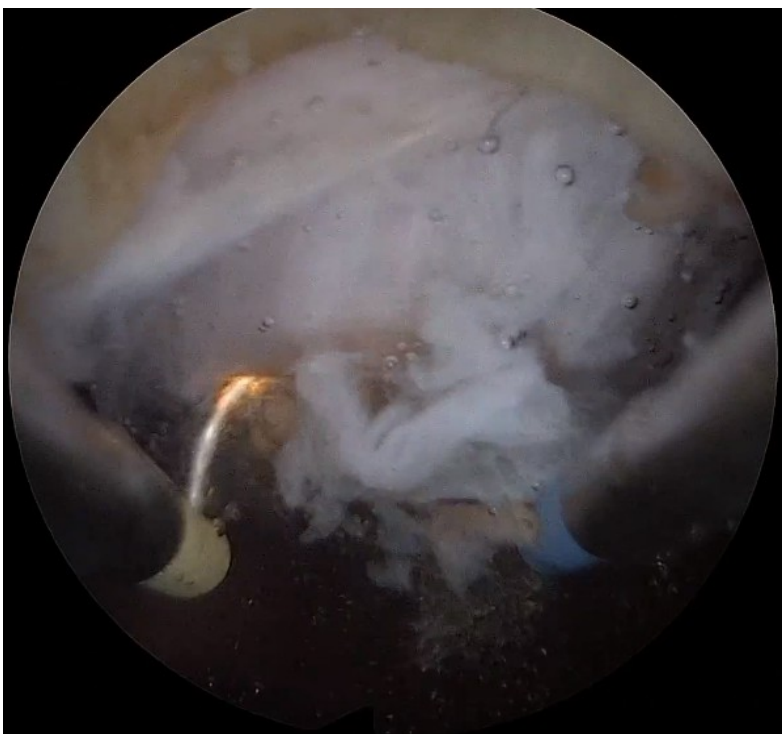
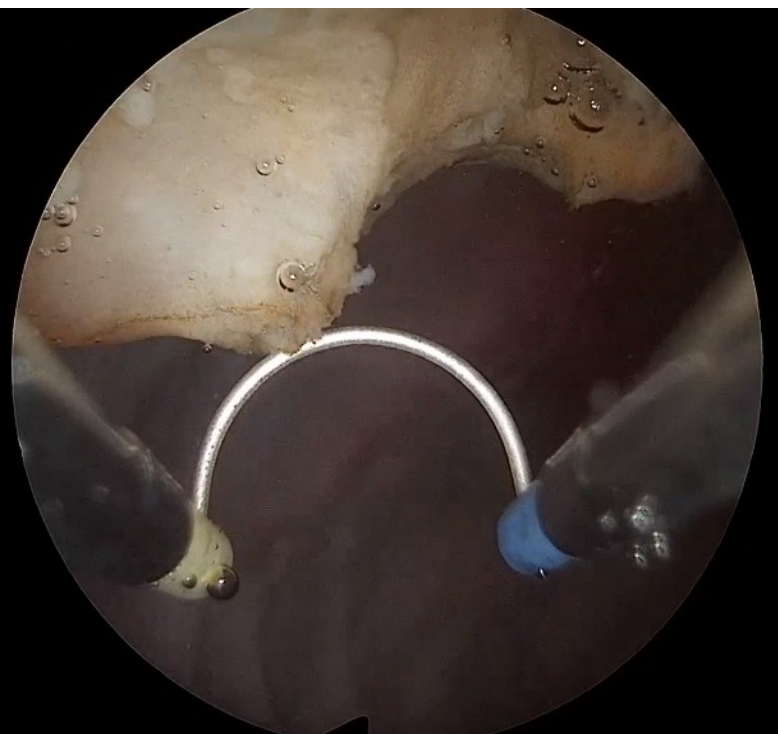
## Real Surgical Training

<https://www.gynsim.com>

Gynesim is a non-profit surgical educational company offering both Real Tissue Model (RTM) surgical simulation training as well as a robust surgical training curricula. Gynesim was founded to address the need of practicing surgeons to advance their minimally invasive surgical skills.

Gynesim provides the highest fidelity laparoscopic, hysteroscopic, cystoscopic and vaginal approach surgical simulation models that look (face validity) and feel (haptics) like the real thing. Their models support the use of all surgical energy systems. These models are presented within realistic surgical platforms appropriate to the surgical task or technology demonstration. All models can be customized to specific pathologic states in order to highlight instrumentation.

The gold standard for device companies is to demonstrate their products on real human beings.....




BEYOND THE REAL, GYNESIM OFFERS THE NEXT  
BEST THING.



# Memories of the Congress







# Global Congress on Hysteroscopy

Barcelona 30 April - 3 May 2019





# Talking About

Hysteroscopy Newsletter Vol 5 Issue 3

## Carnegie Stages

Luis Alonso. Centro Gutenberg. Spain

### ABSTRACT

Embryoscopy consists of direct visualization of the embryo inside the uterine cavity between weeks 5 and 8 of gestation. Fetoscopy is the visualization of the fetus after the 8th week of pregnancy

The development of the embryo from its conception to 60 days (8 weeks) is described in 23 stages of embryonic development, called Carnegie stages.

Palabras Clave:

Embryoscopy, Carnegie,  
Embyo development

This classification is made based on the external morphological characteristics of the embryo and not according to gestational age or embryo size. In fact, two embryos of the same gestational age can be found at different stages of Carnegie, reflecting individual variations in the development of each embryo.

Experiencing a pregnancy loss could be a traumatic experience for the couple. When recurrent, the sensation of frustration and disappointment acquire their highest level.

It is estimated that 15% of previously confirmed pregnancies will end in a first trimester spontaneous abortion.

Recurrent pregnancy loss is defined by 3 or more consecutive abortions. It is estimated to affects 1% of women. Although there have been attempts to determine predictive factors of abortion, no valid conclusion has been reached. The most common risk factor is the history of a previous abortion [1].

The largest study published on recurrent pregnancy loss revealed that 16% of women would abort again in a subsequent pregnancy after a first abortion, 25% of women experienced a third

consecutive abortion after a second gestational loss and 45% will suffer a fourth abortion after 3 previous gestational losses.

The study of the cause of these abortions has focused mainly on factors such as the presence of thrombophilia, uterine malformations or endocrine alterations. But the most frequent cause is the presence of chromosomal alterations in the embryo.

An abnormal karyotype can be detected in up to 70.3% of abortions with trisomy being the most frequent alteration found (64.6% of cases), followed by triploidies (13.1%) and monosomies X ( 10.4%) [2]

On certain occasions, direct visualization of the embryo can assist in the diagnosis of abortions. Hystero-embryoscopy is a technique described in

1954 by Westin [3], using a 10 mm optic. Subsequently, the studies of J. Ferro and T. Phillip helped to further develop this technique up to the way we know it today. Hystero-embryoscopy offers two main advantages:

1- Direct visualization and morphological study of the embryo: it reveals potential structural anomalies such as neural tube defects, craniofacial or limb malformations in chromosomally normal embryos [4]

2- Direct biopsy of the embryo or chorion: avoiding errors in the diagnosis. According to the study by Ferro et al. maternal contamination occurs in 22.2% of the cases in which the sample is obtained by conventional curettage. [5]

Embryoscopy consists of direct visualization of the embryo inside the uterine cavity between weeks 5 and 8 of gestation. Fetoscopy is the visualization of the fetus after the 8th week of pregnancy [6]. The development of the embryo from its conception to 60 days (8 weeks) is described in 23 stages of embryonic development, called Carnegie stages. This classification is made based on the external morphological characteristics of the embryo and not according to gestational age or embryo size. In fact, two embryos of the same gestational age can be found at different stages of Carnegie, reflecting individual variations in the development of each embryo.

There are 23 stages of Carnegie ranging from when a sperm reaches the egg and gives rise to the zygote until stage 23, which is reached at 60 days and in which the embryo measures about 30 mm becomes a fetus. In this last stage the head is rounded, the eyelids cover the eyes, the tail disappears, and the external genitalia are already formed.

It is important to understand the correlation between the gestational age, the size of the embryo and the morphological characteristics of the embryo. The knowledge of these stages in early phases of the pregnancy is important to determine if there is such a concordance between these characteristics and the expected Carnegie stage.

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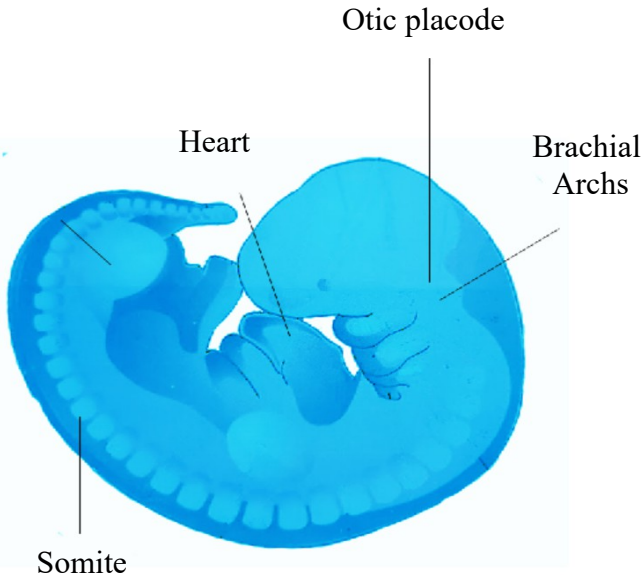
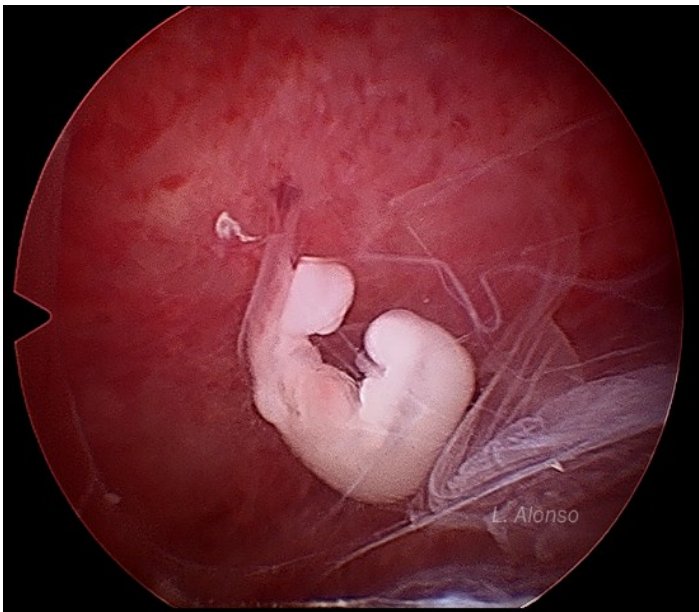
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## Carnegie Stages

Stage	Day	Size (mm)	Characteristics
1	1	0.1	Fertilized egg
2	2-3	0.1-0.2	Morula 6 to 12 cells
3	4-5	0.1-0.2	Blastocyst
4	6	0.1-0.2	Implantation of the blastocyst
5	11-12	0.1-0.2	The blastocyst implants deeply in the endometrium
6	13-15	0.2	The mesoderm develops
7	15-17	0.4	Gastrula. The 3 layers form Endoderm, mesoderm and ectoderm
8	17-19	0.5-1.5	The spinal cord develops
9	19-21	2-3.5	The neural fold develops. 3 pair of somites
10	22-23	2.5-3.5	The embryo is slightly curved. Beginning of the fusion of neural fold. Formation of the 1 <sup>st</sup> and 2 <sup>nd</sup> branchial arcs
11	24-25	2.5-4.5	The embryo is curved. The anterior neuroporo is almost obliterated. Presence of optic and otic plaques
12	26-27	3-5	The embryo has a C shape. Neuroporo rostral is closed and the caudal is almost closed. Presence of the third pharyngeal arc
13	28-30	4-6	Upper extremities appear. Presence of the 4 <sup>th</sup> pharyngeal arc
14	31-35	5-7	The head flex over the body. Upper limbs enlarging. Presence of lower limbs
15	33-36	7-9	Formation of brain structures. Lower limbs enlarging.
16	37-40	8-11	Upper limbs with rudimentary elbows and wrists. Lower extremities growing.
17	41-43	11-14	Body and neck become straight; fingers form in upper extremities
18	44-46	13-17	Formation of the eye lids, ears are rudimentary. Toes are in early stages
19	47-48	16-18	The body and the upper extremities elongate. Intestines and prominent
20	49-51	18-22	Lower extremities bend at the knees. Tale is short but visible.
21	52-53	22-24	Arms and feet get closer, interdigital membrane disappears from fingers
22	54-55	23-28	Neck easily identified; eyelids formed. Feet measure between 4 and 5 mm
23	56-60	27-31	The head molds and is up to ½ the size of the embryo, the tale dissapears

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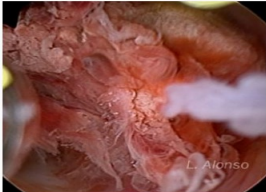
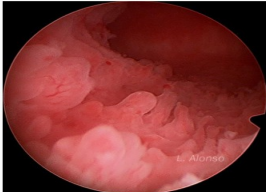

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